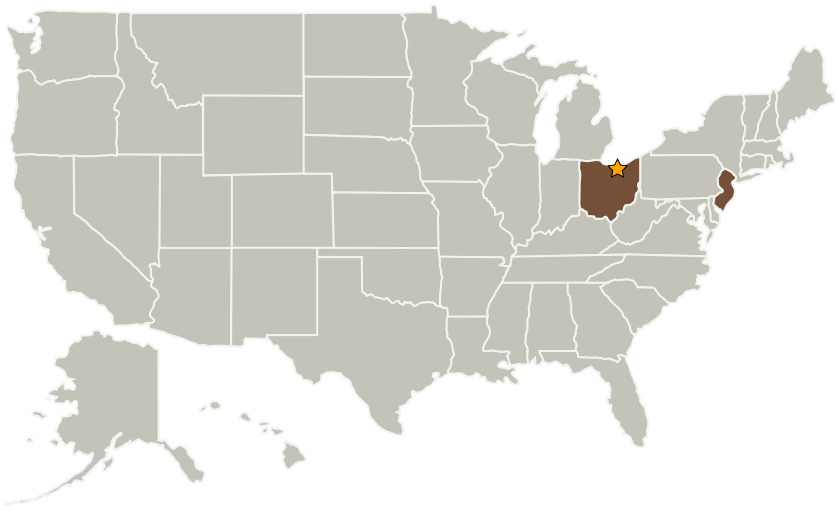
Smart Materials Technology for High Speed Adaptive Inlet/Nozzle Design, Phase I

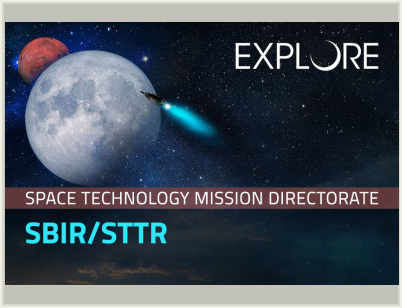
Completed Technology Project (2004 - 2004)

Project Introduction

Enabling a new generation of high speed civil aircraft will require breakthrough developments in propulsion design, including novel techniques to optimize inlet performance across a wide speed range. Maximizing propulsive performance while minimizing weight and mechanical complexity is a key goal for such systems, and rapidly maturing smart materials technology can enable adaptive control of inlet geometry to allow in-flight optimization of engine flows. This proposal will build on established device technology using high strength Shape Memory Alloy (SMA) actuators and will initiate development of adaptive inlets for high speed applications. Leveraging prior work in design and testing of SMA devices in challenging aerospace and marine applications will allow a jump start in development a family of actuation and flow control devices suitable for use in practical flight applications. Actuation systems employing a combination of high temperature SMA alloys and active heat control systems will be developed, along with complementary analysis and design tools for aero/thermo analysis of integrated actuators. The modeling and benchtop testing work proposed for Phase I will lay the groundwork for testing in representative high speed conditions in Phase II.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Continuum Dynamics, Inc.	Supporting Organization	Industry	Ewing, New Jersey

Primary U.S. Work Locations	
New Jersey	Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Todd Quackenbush

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
  - TX15.1 Aerosciences
    - TX15.1.5 Propulsion Flowpath and Interactions